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(54) Title: CONTROL OF A MULTICALL IN A TELECOMMUNICATIONS SYSTEM

(57) Abstract

A telecommunications system comprising an arrangement for controlling a multicall over a transmission path between a telecommunications network and a subscriber terminal. A multicall may have three different bearer configurations: each call of the multicall has a dedicated bearer, or one bearer is shared by all calls of the multicall, or the multicall has both dedicated and shared bearers. When a shared bearer is used, a user can have several independent calls in parallel, which have to alternate in using the bearer, or in some situations, use it simultaneously. The network is arranged to set up any new call in an existing multicall, according to a criterion, either by (i) setting up said new call on a new bearer, or (ii) setting up said new call on an existing bearer so that said existing bearer is shared by at least two calls.

CONTROL OF A MULTICALL IN A TELECOMMUNICATIONS SYSTEM

Field of the Invention

The invention relates to a call control of a multicall in telecommuni-
5 cation systems, particularly in wireless telecommunications systems.

Background of the Invention

A wireless communications system generally refers to any tele-
communications system which enables a wireless communication between the
10 users and the network. In mobile communications systems users are capable
of moving within the service area of the system. A typical mobile communica-
tions system is a Public Land Mobile Network (PLMN).

At present, third generation (3G) mobile systems, such as Universal
Mobile Communication System (UMTS) and Future Public Land Mobile Tele-
15 communication System (FPLMTS) later renamed as IMT-2000 (International
Mobile Telecommunication 2000), are being developed. The UMTS is being
standardized in the ETSI (European Telecommunication Standards Institute)
whereas the ITU (International Telecommunication Union) is defining the IMT-
2000 system. A radio interface is likely to be based on a wideband CDMA
20 (Code Division Multiple Access) scheme, and therefore the third generation
systems are often referred to as Wideband CDMA systems (WCDMA).

It has been suggested that future 3G systems should support multi-
ple, simultaneous and independent calls to/from a single mobile station.

A problem with the prior publications related to 3G systems is that
25 the handling of multiple calls is only specified on a "should-be possible" level.
In other words, the prior publications almost completely ignore the manage-
ment details of multicalls to/from a single mobile station. In a second genera-
tion (2G) system, such as the GSM (the Global System for Mobile communi-
cation), there is one situation where a mobile station can have two calls. Such
30 a situation may arise if a subscriber has a supplementary service (SS) called
Call Hold (CH). However, a 2G mobile station does not have multiple inde-
pendently-controlled bearers (i.e. traffic channels), and in a CH situation, only
one call can be active while all others are put on hold. Even in the so-called
high-speed data transfer (HSCSD), a mobile station uses several time slots
35 but all the time slots are assigned to a common traffic channel.

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Disclosure of the Invention

For convenience, the term 'multicall' will be used to describe multiple, independent and simultaneous calls to/from a single mobile station using multiple independently-controlled traffic channels. Some of the calls can be
5 mobile-originated (MO) calls and some can be mobile-terminated (MT) calls. An object of the invention is to provide call control mechanisms for supporting such multicalls. The user of the mobile station should be able to receive and place new calls independently of ongoing calls. Another object of the invention is to preserve at least some of the current 2G supplementary services within
10 reasonable limits, in the 3G systems as well as to enable multicall handovers between the 2G and 3G systems.

An aspect of the invention is a method of controlling a multicall in a telecommunications system over a transmission path between a telecommunications network and a subscriber terminal, said method comprising the steps
15 of

setting up any new call in an existing multicall, according to a criterion, either by

(i) setting up said new call on a new bearer, or

(ii) setting up said new call on an existing bearer such that said ex-
20 isting bearer is shared by at least two calls.

Another aspect of the invention is a telecommunications system comprising an arrangement method of controlling a multicall over a transmission path between a telecommunications network and a subscriber terminal, and in which system the network is arranged to set up any new call in an ex-
25 isting multicall, according to a criterion, either by

(i) setting up said new call on a new bearer, or

(ii) setting up said new call on an existing bearer such that said existing bearer is shared by at least two calls.

A further aspect of the invention is a subscriber terminal for a tele-
30 communications system, said terminal being capable of having a multicall over a transmission path between a telecommunications network and a subscriber terminal, in which system the terminal is arranged to be able, at a setup stage of a new call in an existing multicall, to indicate whether said new call is set up on a new bearer or on an existing bearer such that said existing bearer will be
35 shared by at least two calls.

A multicall according to the present invention may have three differ-

ent bearer configurations: each call of the multicall has a dedicated bearer, or one bearer is shared by all calls of the multicall, or the multicall has both dedicated and shared bearers. When a shared bearer is used, a user can have several independent calls in parallel which have to alternate in using the
5   bearer, or in some situations, use it simultaneously.

In an embodiment of the invention, the mobile user is able to, if network conditions or circumstances allow, to control whether a dedicated bearer mode or a shared bearer mode is used for a call, the network can not force the use of either mode. The user of a subscriber equipment may indicate
10 at call setup whether a new dedicated bearer is needed for a new call or whether an existing bearer, and which one, shall be used and shared by one or more existing calls. According to another embodiment, the network may, in some situations, suggest, or even force, the call to use some bearer configuration. An example of this is an incoming data call, which should be offered to
15 the user as a dedicated bearer call (Call Hold not allowed for data calls). Another example is a case when the use of multicall is limited, e.g. due to 3G-2G interworking; it saves unnecessary signaling if the network already in the setup indicates which options are available.

In an embodiment of the invention, the sharing of a common bearer
20 is carried out by means of a call hold mode (CH): when the user puts a call on hold the traffic bearer is removed from the call to be used by other calls. As a consequence, one of the calls on that bearer is in an active mode and the other call(s) in a hold mode. In this case, if an existing bearer is selected at call setup of a new call, the call(s) which use the bearer to be shared must be
25 put on hold before the new 'sharing' call is initiated.

In an embodiment of the invention, the user is able to toggle the call between the dedicated bearer mode and the shared bearer mode, if desired, i.e. it is possible to change the serving bearer in/during a call.

The basic principle of this invention is that the call control protocol is
30 enhanced such that the bearer which is subjected to a call control procedure in progress, is addressed. The invention also provides means to change the associations between calls and bearers in the multicall. This enables the bearer resources to be flexibly and effectively used according to the circumstances and users' and/or networks' preferences at a given moment. For example,
35 when one bearer and two calls are involved, one of which is active and the other on hold, the user may establish a new bearer and move the call on hold

to the new bearer and vice versa. The user may also move a call from one bearer to another. Likewise, when two speech calls on two parallel bearers are involved, the subscriber may merge the calls into a conference call.

The invention also enables a third generation mobile communica-
5 tions system to support and interact with at least call waiting (CW), and call hold (CH), or multiparty call (MPTY) supplementary services (SS) of a 2G mobile communications system, such as the GSM.

With the introduction of a multicall in the 3G, the need for the CH and MPTY SSs diminishes, because it is possible to implement the corre-
10 sponding functionality in the terminal. An advantage of implementing these functions in the terminal is the non-existent need to standardize these services, which enables the mobile terminal manufacturers to independently and flexibly develop these services and the corresponding user interface in the terminal.

15 It is, however, necessary to preserve the GSM SSs in 3G. Support of UMTS-GSM interworking and handovers, GSM evolution, GSM user conventions etc., are reasons for this requirement. In the case of CH and MPTY, one important reason is the capacity; instead of allocating one bearer per (peer) call party, all calls use the same bearer.

20 A new problem presented by this coexistence of CH/MPTY services and a multicall in the 3G system is which mode of operation the call control procedures concern. An example of this is for example given when the mobile user sets up a new call; does he or she want the new call to use an existing bearer or a new independent bearer to be allocated. This invention addresses,
25 and solves, this problem.

The invention further enables an inter-system handover between the 2G and 3G systems.

Brief Description of the Drawings
30 In the following, the invention will be described in greater detail by means of the preferred embodiments with reference to the accompanying drawings, in which

Figure 1 shows a simplified architecture of a 3G mobile system,

Figures 2A and 2B illustrate different architectures allowing inter-
35 working of 2G and 3G mobile systems,

Figures 3A, 3B and 3C illustrate a 2G multicall with a shared bearer,

a 'pure' 3G multicall with dedicated bearers and a 3G multicall with dedicated and shared bearers, respectively.

Preferred Embodiments of the Invention

5   In the following, the preferred embodiments of the invention are described as implemented in a third generation (3G) mobile communications system, such as the UMTS system. The invention is, however, applicable to any telecommunication system.

        Fig. 1 shows a simplified 3G architecture. The 3G mobile station MS
10   communicates via a 3G Radio Access Network RAN with a 3G Mobile Switching Centre (3G-MSC). The 3G MSC is interworking with (an)other telecommunications network(s), such as Public Switched Telephone Network PSTN or Public Land Mobile Network PLMN.

        In Fig. 1, a communication link is established between the MS and
15   a peer terminal in the PSTN/PLMN. A simplified protocol layer structure is also shown in order to facilitate the description of the present invention. The highest protocol layer is between the applications in the MS and the peer terminal. Any number of speech and/or data calls may exist between the applications. The call control protocol (CC) is one of the protocols of the Connection Man-
20   agement (CM) sublayer. The CM is the highest sublayer of Layer 3 in the 3G and 2G systems. The elementary procedures of the call control protocol may be grouped into the following classes: call establishment procedures, call clearing procedures, call information phase procedures and miscellaneous procedures. In Fig. 1, the call control protocol employed between the MS and
25   the 3G-MSC is referred to as a 3G-CC, and the call control protocol employed between the 3G-MSC and the peer terminal is referred to as an xCC. The lower layers include at least the transport layer and the transport layer control protocols.

        The first operating 3G networks will be based on an interworking
30   concept where in the 3G radio network is connected to a 2G core network via an interworking unit IWU. As far as CC is concerned (and Mobility Management MM), there are two alternatives to implement this concept, basically either a backward compatible approach in which a second generation call control (2G-CC) is used between the MS and the 2G-MSC such that IWU relays
35   2G-CC messages without further processing and provides interworking only on the lower layers, as shown in Fig. 2A, or a 'full' IWU approach in which the

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IWU performs mapping between the 3G and 2G messages, as shown in Fig. 2B. The backward compatible approach is possible, since most mobile stations will probably be 3G-2G dual-mode stations, so they will anyway contain the 2G-CC. In the 'true' IWU alternative a single mode 3G mobile only needs the
5   3G-CC.

In these different system architectures, every mobile station MS must support the 3G (or 2G) call control protocol in the circuit switched mode. The peer entity of the MS call control entity on the network side is the call control functionality in the MSC. In the call control protocol, a dedicated CC
10   entity is defined for each call. Each CC entity is independent of each other and should communicate with the correspondent peer entity. Different CC entities use different transaction identifiers (TI).

As used herein the term bearer refers to a both-way or a one-way and a symmetric or an asymmetric connection between the mobile and the
15   MSC or the peer end the user. In the GSM specifications, the corresponding term to bearer is channel, traffic channel and, in some cases, 'configuration'. Bearer negotiation refers to a procedure for reaching an agreement between the MS and the MSC on the properties of a new bearer or new properties of an existing bearer. The negotiation basically consists of a question and an an-
20   swer and a request for a bearer with specified properties and a positive or negative acknowledgement. In the GSM, the definition of required bearer properties in a call is carried out by the Bearer Capability information element (BC_IE). In the 3G-CC, the BC_IE has the same role. A bearer is identified by the Bearer Identifier (BID).

25   A multicall, i.e. several simultaneous and independent calls to one MS, is a central new feature in the 3G. As noted above, a call has CC peer entities in the MS and the MSC, which communicate via L3 CC messages. Each call has one connection whose characteristics are given in a setup message by means of the BC IE. The different calls of one terminal are independ-
30   ent in the MSC. One call can be e.g. a normal speech call, or a fax or a data call. A call can also be part of a multimedia session. The collection and synchronization of all calls forming a multimedia session is carried out by the application in the terminal. Each independent call must have an identifier, such as a transaction identifier (TI) similar to that used in the GSM, for separating
35   L3 CC message sequences of each other. The length of the TI may be one octet, for example, which enables 256 simultaneous calls in one MS.

A basic assumption in connection with a 3G multicall has been that each call has one dedicated bearer, i.e. each new call (MO and MT) generates a new bearer, as illustrated in Fig. 3B. Also in the GSM, the L3 protocol architecture allows several parallel calls, the limitation being that there is only one
5 traffic channel, or bearer (in 3G terms), which the different calls share. This is facilitated by the CallHold and Multiparty supplementary services. With Call-Hold, the calls alternate in using of the traffic channel, and in the Multiparty supplementary service the user data (which is always speech) is summed.

A 3G multicall according to the present invention may have three
10 different bearer configurations: each call of the multicall has a dedicated bearer, or one bearer is shared by all calls of the multicall, or the multicall has both dedicated and shared bearers, as illustrated in Fig. 3C. The "shared" 3G bearer mode may be based on call control procedures which are similar to those used in the GSM for the CallHold supplementary service.
15 When a shared bearer is used, the user can have several independent calls in parallel which have to alternate in using of the bearer. The sharing may be carried out by means of a call hold mode (CH): when the user puts a call on hold, the traffic bearer is removed from the call to be used as a channel. As a consequence, one of the calls on that bearer is in an active
20 mode and the other call(s) in a hold mode. A user of the subscriber equipment indicates at call setup whether a new dedicated bearer is needed for a new call or whether an existing bearer, and which one, is to be used and shared with one or more existing calls. If an existing bearer is selected, the call(s) which use the bearer to be shared must be put on hold before the new 'shar-
25 ing' call is initiated. A preferred feature of the invention is that the mobile user is able to control, when the network conditions or circumstances allow, whether a dedicated bearer mode or a shared bearer mode is used for a call. However, at least in some situations, it may be possible that the network may suggest, or even force, the use of either mode. Examples of such a situation
30 include situations wherein a specific parameter or information in the subscriber data or a load situation in the network or at the base station. It is also possible that the network allocates a dedicated bearer to a data call by default, and the user may choose the bearer mode only in the speech call setup. In the latter embodiment, the user may however be able to toggle the data calls between
35 the shared and dedicated bearer modes. It is one preferred feature of the invention that the user is able to toggle the call between the dedicated bearer

mode and the shared bearer mode, if desired, i.e. it is possible to change the serving bearer in/during a call.

In the following, some examples are given of bearer negotiations for different call situations in a 3G system according to the present invention,
5   when the bearer mode is primarily selected according to the users' preference.

Mobile Originated (MO) multicall

The basic call setup procedure may be very similar to those used in the 2G systems or proposed for the 3G systems. The following description
10 concentrates only the features which relate to the implementation of the present invention. As normally, the MS may initiate an MO call setup by sending a call setup message SETUP.

In the SETUP message, the user of the mobile station may indicate to the network that a previously allocated bearer can be used instead of allo-
15 cating a new bearer. The user must then identify the existing bearer which she wants to use by indicating the respective bearer ID in the setup message. If the user wants a new bearer for a call, the bearer ID information element in the SETUP message is empty or contains a predetermined value, such as '1111', or the ID of a bearer which is not currently in use.

20   When the 3G network (the MSC) receives a call setup message from the mobile station MS and the bearer ID element is empty or '1111', the network (by default) allocates a new bearer for the call. This applies to the first call of the MS. Each allocated bearer is identified by a Bearer ID. The network selects the bearer ID and returns it to the MS in a CALL_PROCEEDING mes-
25 sage, for example.

When the network receives a setup message with a bearer ID of an existing bearer, the network allocates this bearer to the call. Any existing call(s) which use(s) the bearer to be shared may be put on hold before the new 'sharing' call is initiated, if this feature is preferred.

30   The user may release a call from a shared bearer through a call release message which contains the transaction identifier TI of the call. The shared bearer is released when the last call using that bearer is released.

The user is able to toggle the call between the dedicated bearer mode and the shared bearer mode, if desired, i.e. it is possible to change the
35 serving bearer in/during a call.

Changing the 'bearer mode' from 'dedicated bearer' mode to

'shared-bearer' mode and vice versa is needed in various situations, e.g. when the network (or the user) wants to limit (decrease) the number of bearers. This can be carried out by utilizing the existing (in the GSM) MODIFY-procedure, by which the bearer or call properties can be modified (negotiated) during the call.

5   The MODIFY-procedure essentially consists of the modification request, the MODIFY-message, and an acknowledgement, the MODIFY_COMPLETE-message. The change of bearer mode can be implemented by adding the Bearer ID to the MODIFY and the MODIFY_COMPLETE messages. When the user wants to associate the call with an existing bearer, the BID of this bearer

10 is included in the MODIFY-message. If the user wants a new (dedicated) bearer to be allocated for the call, this can be indicated by giving the BID a certain value (e.g. '1111'). In all 'bearer reassociation' cases the MOD-IFY_COMPLETE-message can contain the result, i.e. the BID of the bearer which is associated with the call.

15   An alternative way to get a new bearer in a call is to send a setup message. In other words, the user sends a SETUP message with an active TI and an indication that a new bearer is requested, such as the bearer ID '1111'. The network allocates a new bearer and separates the existing call from the shared bearer.

20   The user is able to put any call on any dedicated or shared bearer on hold by sending a hold activation message HOLD, which contains the transaction identifier TI of the respective call. No bearer ID is required. When the network (e.g. MSC) receives the HOLD message, the network puts the call identified by the TI on hold, i.e. closes the user information path which relates

25 to that call. It should be noted that when a call is on hold, the CC peer entities of the call in the MS and in the network are maintained although the user information is not transferred. The call can be returned from the hold mode into the active mode by sending a hold deactivation message RETRIEVE which again contains the TI of the respective call.

30   In any one of the above cases the network may, according to some embodiments of the invention, force or suggest a bearer mode other than that requested by the user if the network conditions or other reason require this.

Mobile Terminated (MT) multicall

35   The basic call setup procedure may be very similar to those used in the 2G systems or proposed to the 3G systems. The following description only

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concentrates on the features which relate to the implementation of the present invention. As normally, the 3G network (e.g. MSC) may initiate an MT call setup by sending a call setup message SETUP to the MS. An alternative is to offer a new MT call to the MS having one or more active call by means of a
5 Call Waiting (CW) supplementary service.

The network operator may have certain preferences which it should be able to promote. Therefore, in one embodiment of the invention, the network can indicate or suggest in the incoming SETUP message which bearer is to be used. A new bearer may be indicated by a certain value, such as
10 ('1111').

The MS responses to or acknowledges the SETUP message or the CW by sending some kind of response message(s) in the call setup procedure, such as CALL_CONFIRMED or CONNECT_Ack. Any such response message or other such message can be utilized by the user of the mobile sta-
15 tion to indicate to the network that a previously allocated bearer can be used instead of allocating a new bearer, in a similar manner to that described above in connection with the MO call. In other words, the user must identify the existing bearer which the user wants to use by indicating the respective bearer ID in the setup message. If the user wants a new bearer for a call, the bearer
20 ID information element in the SETUP message is empty or contains a predetermined value, such as '1111'.

When the 3G network (e.g. the MSC) receives a message, such as CALL_CONFIRMED, from the mobile station MS and the bearer ID element is empty or '1111', the network (by default) allocates a new bearer to the call.
25 This applies to the first call of the MS. Each allocated bearer is identified by a Bearer ID. The network selects the bearer ID and returns it to the MS.

When the network receives a message, such as CALL_CON-FIRMED, with a bearer ID of an existing bearer, the network associates this bearer with the call. Any existing call(s) which use(s) the bearer to be shared is
30 put on hold before the new 'sharing' call is initiated.

The user may release a call and toggle the call between the dedicated bearer mode and the shared bearer mode as well as between the hold mode and the active mode in a similar manner to that described above in connection with the MO multicall.
35   In any one of the above cases the network may, according to some embodiments of the invention, force or suggest a bearer mode other than that

requested by the user if the network conditions or other reason require this.

3G Multicall service interaction with 2G supplementary services

A multicall requires that the user should be able to receive calls in-
5 dependently of ongoing calls and to place new calls independently of ongoing
calls. This requirement interacts, or interferes, with certain situations occurring
in some supplementary services.

The following Supplementary Services (SS) are triggered by 'user
busy' condition: Call Waiting (CW), Call Forwarding on Busy (CFU), and Call
10 Completion to Busy Subscriber (CCBS). In addition, the following Supple-
mentary Services involve elements that may interact with a multicall (e.g. a
multicall offers the possibility of implementing the service in the MS): Multiparty
Call (MPTY), Call Hold (CH), Explicit Call Transfer (ECT).

In the GSM there are two ways to express that the user is busy and
15 cannot receive calls. The User Determined User Busy (UDUB) condition oc-
curs when the user rejects an offered call by responding to the received
SETUP message with a CALL_CONFIRMED or RELEASE_COMPLETE mes-
sage with the cause "user busy". Alternatively, the network (MSC) can deter-
mine that the (bearer) resources of the user are occupied, i.e. Network Deter-
20 mined User Busy (NDUB).

The available number of bearers in GSM is one, and NDUB occurs
when this one bearer (connection) is occupied. In the 3G there is no definite
limit to the number of bearers. The criteria should rather be the ability of the
user to handle simultaneous calls than the physical limits of the system.

25 In an embodiment of the invention, the definition of Network Deter-
mined User Busy (NDUB) is changed to state that the maximum number of
basic calls (not including Call Waiting calls) is a value N, which can be as-
signed e.g. on a per network element or a per subscriber basis. In a further
embodiment, the maximum number of calls (N) can be given separately for
30 each basic call type. This way it is possible e.g. to limit the number of parallel
speech calls to one, but simultaneously have several (CS) data or fax calls ac-
tive. The user may indicate to the network the NDUP limit and change the limit
during the call.

Call Waiting means that an incoming call is offered to a busy user.
35 In the 3G the meaning or role of the CW changes from that in the GSM since a
multicall implicitly offers the corresponding functionality. However, since it is a

clear requirement that CW should be supported in the 3G, the possible interaction problems between the multicall and the CW have to be considered.

If the shared bearer mode is not used in the multicall and/or the NDUB is unlimited, the CW is not needed for offering a new call.

5   When the shared bearer mode is used and the NDUB is limited, the network sets up new calls until the number of calls reaches the NDUB. After reaching the NDUB, the network may offer new calls by means of the CW. This is also possible for a busy subscriber. This way, the CW works 'above' the multicall; both the multicall and the CW function as they are expected.

10   In the 3G, when an incoming CW call is allowed, the maximum number of bearers is already in use. The user must choose (if he has more than one active call) a call to put on hold and accept the new call with the indication which bearer to use. The user may be able to determine on the basis of the received information whether the newly-offered call is a speech call or a data call.

15   data call. If the call is a data call, it is not normally reasonable to put the call on hold.

A 3G multicall enables a multiparty call to be implemented in the MS, i.e. combining the speech paths of separate two 'dedicated bearer' calls in the terminal. This, however, leads to (unnecessary) waste of resources since it

20   maintains two (or more) speech paths over the air.

In the GSM, a multiparty call is initiated from one active and one held call which both share the same bearer. In the 3G, it must be possible to combine at least two 'dedicated bearer' multicalls into a multiparty call. This can be carried out by means of changing one of the calls from a dedicated

25   bearer to share the bearer of the other call according to the principles of the invention such that both calls are in a shared bearer mode, one active and the other one on hold. If the multiparty call is to be established for calls already in the shared bearer mode, this step is naturally omitted. In the shared bearer mode, the Multiparty service can be initiated just like in the GSM (by sending a

30   FACILITY message referring to the TI of either call with a BuildMPTY indicator). As a result, the 2G multiparty call supplementary service can be fully supported in the 3G system.

In the case of 3G-2G dual-mode stations, also intersystem handovers are available which may change the available bearer capabilities and the

35   service level offered by the network. The present invention allows handover of a multicall from a 3G system to a 2G system, such as the GSM. This is

achieved by putting all calls (irrespective of whether they have been in a dedi-
cated bearer mode or a shared bearer mode) of the multicall on a common
shared bearer prior to the handover. One of the calls is to be active and the
other(s) on hold. However, data calls are not normally put on hold but released
5 prior to the handover. The handover of the multicall can thus be carried out in
a similar manner to that of internal handover in the 2G system. In the 2G sys-
tem, the multicall continues on a shared bearer with one call active and the
other(s) on hold.

The application has been described above by means of the pre-
10 ferred embodiments in order to illustrate the principles of the invention. The
details of the invention may vary within the scope and spirit of the accompa-
nying claims.

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CLAIMS

1. A method of controlling a multicall in a telecommunications system over a transmission path between a telecommunications network and a subscriber terminal, c h a r a c t e r i z e d by a step of

5   setting up any new call in an existing multicall, according to a criterion, either by

(i) setting up said new call on a new bearer, or

(ii) setting up said new call on an existing bearer such that said existing bearer is shared by at least two calls.

10   2. A method according to claim 1, wherein a decision whether the new bearer is required or whether said existing bearer is to be used is made by the network according to said criterion.

3. A method according to claim 1 or 2, wherein said criterion is a preference of a user of said subscriber terminal.

15   4. A method according to claim 1 or 3, comprising a step of

indicating in a call setup signalling from said subscriber equipment to said network whether the new bearer is required or whether said existing bearer is to be used.

5. A method according to claim 1, 2 or 3, comprising a step of

20   indicating in a call setup signalling which existing bearer is to be used.

6. A method according to claim 5, wherein said step of indicating comprises a step of

indicating in the call setup signalling a bearer ID of the existing

25   bearer to be used.

7. A method according to any one of claims 1 to 6, comprising a step of

allocating a dedicated bearer to the new call by a default by the network if the user does not indicate in the call setup any existing bearer to be

30   used.

8. A method according to any one of claims 1 to 7, comprising a step of

changing a call currently being on a shared bearer to use a new dedicated bearer.

9. A method according to claim 8, wherein said step of changing comprises the steps of

sending, from the subscriber equipment to the network, a call setup message containing a transaction identifier of said call currently on the shared
5   bearer and an indication that a new dedicated bearer is requested,

allocating in response to said call setup message, a new dedicated bearer and transferring the call indicated by the transaction identifier received to said allocated bearer by the network.

10. A method according to any one of claims 1 to 9, comprising a
10 step of

changing a call currently using a dedicated bearer to use another bearer shared with at least other call.

11. A method according to claim 10, wherein said step of changing comprises the steps of
15   sending, from the subscriber equipment to the network, a call setup message containing a transaction identifier of said call having the dedicated bearer and a bearer ID indicating the shared bearer to be used,

transferring, by the network in response to said call setup message, the call indicated by the transaction identifier received to said existing bearer.

20   12. A method according to any one of claims 1 to 11, comprising a
    step of

putting an existing call on an existing bearer of said multicall into a hold mode prior to setting up said new call on said existing bearer.

13. A method according to any one of claims 1 to 12, comprising a
25 step of

alternating the calls on a shared bearer between an active mode and said hold mode by the user.

14. A method according to claim 13, wherein said alternating com-
prises a step of
30   sending a hold message containing a transaction identifier of a call in order to put the respective call on hold.

15. A method as claimed in any one of claims 1 to14, comprising a
    step of

offering a new subscriber-equipment-terminating call to the user by

means of a call waiting supplementary service.

16. A method as claimed in any one of claims 1 to 14, comprising a step of

offering a new subscriber-equipment-terminating call to the user by
5 means of a call waiting supplementary service only when a maximum number
of the bearers allowed has been used by the multicall.

17. A method according to any one of claims 1 to 16, wherein said
telecommunications system comprises two telecommunications networks of
different generations, the first one of the telecommunications networks sup-
10 porting both shared bearers and dedicated bearers for a multicall, and the
second one of the telecommunications networks supporting only the shared
bearers for a multicall, and said method comprises an inter-network multicall
handover comprising the steps of

putting calls of the multicall subjected to handover irrespective of
15 whether they have been in a dedicated bearer mode or a shared bearer mode,
on a common shared bearer in said first network prior to the handover,

carrying out of handover said multicall onto a shared bearer in said
second telecommunications network.

18. A telecommunications system comprising an arrangement for
20 controlling a multicall over a transmission path between a telecommunications
network and a subscriber terminal, c h a r a c t e r i z e d in that the network is
arranged to set up a new call in an existing multicall, according to a criterion,
either by

(i) setting up said new call on a new bearer, or
25   (ii) setting up said new call on an existing bearer such that said ex-
isting bearer is shared by at least two calls.

19. A system according to claim 18, wherein a decision whether the
new bearer is required or whether said existing bearer is to be used is made
by the network according to said criterion.

30   20. A system according to claim 18 or 19,wherein said criterion is a
preference of a user of said subscriber terminal.

21. A system according to claim 18, 19 or 20, wherein a call setup
signalling from said subscriber equipment to said network contains an indica-
tion whether the new bearer is required or whether said existing bearer is to be

used.

22. A system according to any one of claims 18 to 21, wherein said call setup signalling contains an indication which existing bearer is to be used, preferably the bearer ID of the existing bearer which is to be used, and wherein the network is arranged to allocate a dedicated bearer to the new call by a default if no indication of any existing bearer to be used is received in said call setup signalling.

23. A system according to any one of claims 18 to 22, wherein

the subscriber equipment is arranged to send to the network a call setup message for changing a call currently being a shared bearer to use a new dedicated bearer, said message containing a transaction identifier of said call and an indication that a new dedicated bearer is requested,

the network is responsive to said call setup message for allocating a new dedicated bearer and transferring the call indicated by the received transaction identifier to said allocated bearer.

24. A system according to any one of claims 18 to 23, wherein

the subscriber equipment is arranged to send to the network a call setup message for changing a call currently using a dedicated bearer to use another bearer shared with at least other call, said message containing a transaction identifier of said call having the dedicated bearer and a bearer ID indicating the shared bearer to be used,

the network is responsive to said call setup message for transferring the call indicated by the transaction identifier received to said existing bearer.

25. A system according to any one of claims 18 to 24, wherein

the network is arranged to offer a new subscriber equipment terminating call to the user by means of a call waiting supplementary service on a shared bearer either always or only when a maximum number of the bearers allowed has been used by the multicall.

26. A system according to any one of claims 18 to 25, comprising a step of

putting an existing call on an existing bearer of said multicall into a hold mode prior to setting up a new call.

27. A subscriber terminal for a telecommunications system, said terminal being capable of having a multicall over a transmission path between

18

a telecommunications network and a subscriber terminal, c h a r a c t e r i z e d in that the terminal is arranged to be able to indicate at a setup stage of a new call in an existing multicall whether said new call is set up on a new bearer or on an existing bearer such that said existing bearer will be shared by at least
5   two calls.

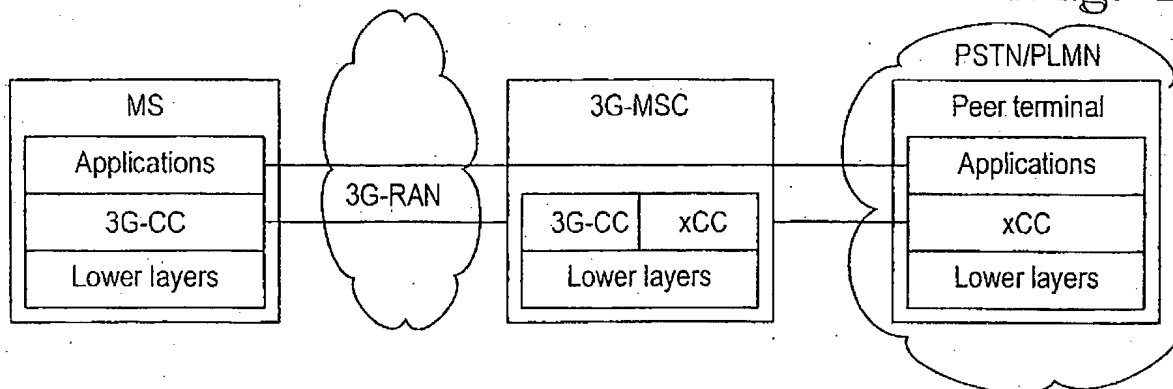28. A subscriber terminal according to claim 27, wherein said terminal is a mobile station for a mobile communications system.
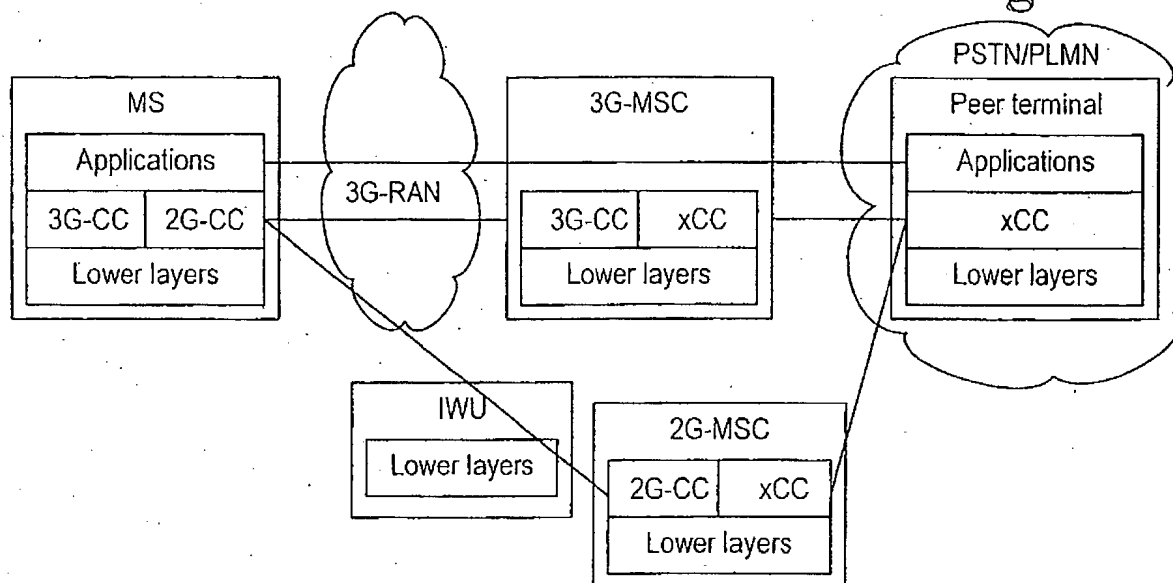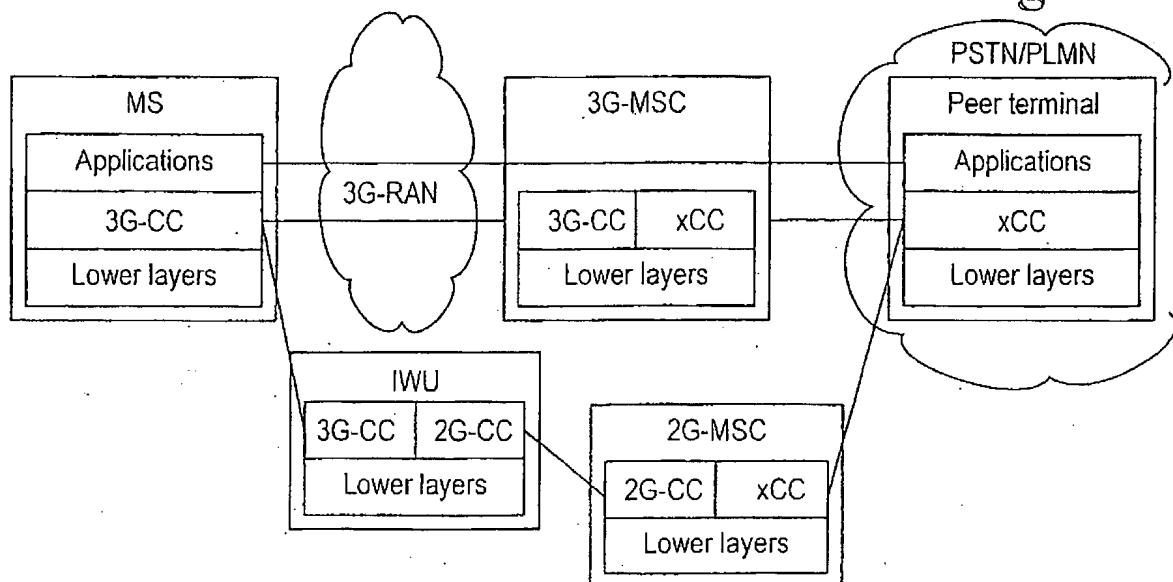
Fig. 1

Fig. 2A

Fig. 2B

Fig. 3A
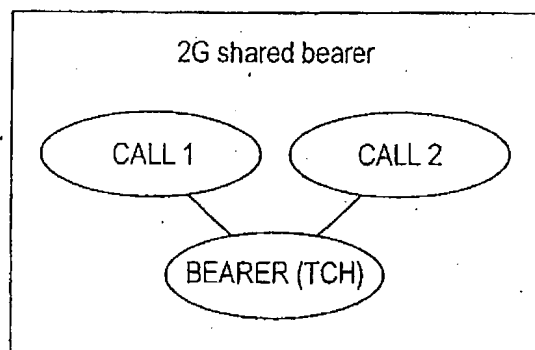
Fig. 3B
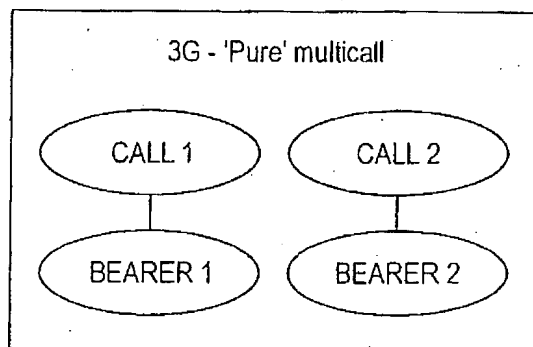
Fig. 3C
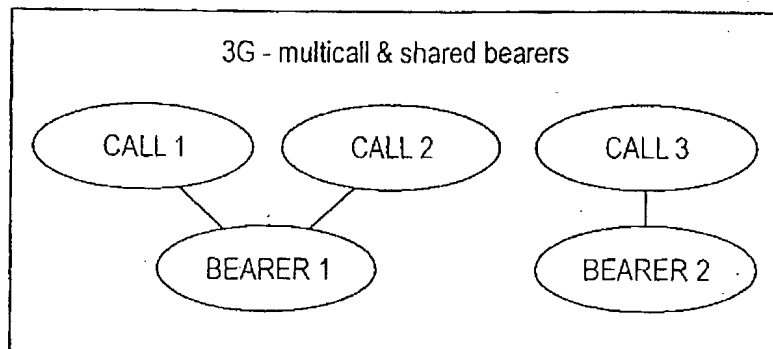
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9820693 A2 (TELEFONAKTIEBOLAGET LM ERICSSON), 14 May 1998 (14.05.98), page 11, line 11 – page 15, line 5, figure 1, claims	1-28
A	EP 0814626 A2 (NTT MOBILE COMMUNICATIONS NETWORK INC.), 29 December 1997 (29.12.97), abstract	1-28
A	WO 9806225 A2 (TELEFONAKTIEBOLAGET LM ERICSSON), 12 February 1998 (12.02.98), figure 1a	1-28

[X] Further documents are listed in the continuation of Box C.   [X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 March 2000	28 -03- 2000

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INTERNATIONAL SEARCH REPORT

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	WO 9953704 A1 (NOKIA TELECOMMUNICATIONS OY), 21 October 1999 (21.10.99), page 3, line 7 - page 5, line 13, claims	1-28

02/12/99

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EP	0814626	A2	29/12/97	JP	10075478	A	17/03/98
WO	9806225	A2	12/02/98	AU EP PL US	3790297 0917807 331520 5926755	A A A A	25/02/98 26/05/99 19/07/99 20/07/99
WO	9953704	A1	21/10/99	FI	980828	D	00/00/00